

Rocky Mountain Spotted Fever

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Rocky Mountain spotted fever (RMSF) is caused by the bacterium *Rickettsia rickettsii*.

B. Clinical Description

The onset of RMSF is sudden. Cases usually present with a moderate to high fever, significant malaise, muscle pain, headache, chills, and eye inflammation. Over half of cases develop a rash or small bruises on the arms and legs, which typically begins 2–6 days after the onset of illness. The rash spreads to the palms and soles, and then to much of the body. Among untreated individuals, these signs and symptoms typically persist for 2 to 3 weeks, and the case-fatality rate ranges from 13% to 25%. More advanced manifestations include loss of red blood cells (anemia) and platelets (thrombocytopenia), severe clotting disorders, involvement of the major organ systems, and shock. Severe cases can result in long-term illness, often neurological. If the disease is promptly recognized and treated, death is uncommon. However, for the United States overall, the reported case-fatality rate for RMSF has been 3–5% in recent years.

C. Vectors and Reservoirs

In Massachusetts, the primary vector for RMSF is the dog tick (*Dermacentor variabilis*), which also serves as a reservoir. Among ticks, *R. rickettsii* is spread through eggs and between life stages. While several small wild animals as well as dogs may have antibodies to *R. rickettsii*, their role as possible reservoirs in the maintenance of RMSF is uncertain.

D. Modes of Transmission

RMSF is acquired from a tick bite. Laboratory data suggest that the tick must remain attached for 4 to 6 hours before the transmission of *R. rickettsii* can occur.

E. Incubation Period

Signs of RMSF typically develop one week after exposure (range 3 to 14 days). The length of the incubation period is associated with the magnitude of exposure to *R. rickettsii*.

F. Period of Communicability or Infectious Period

RMSF is not communicable from person-to-person.

G. Epidemiology

While most cases have been reported in southern and midwestern states, RMSF is widespread in the United States and cases have been reported from many areas within Massachusetts. RMSF incidence rises between April and October, when the risk of contact with ticks is greatest. The risk of mortality from RMSF is higher for men, people over the age of 40, non-whites, individuals who do not develop (or recognize) the typical rash and individuals with no history of a tick bite. As children tend to have more contact with tick-infested areas, most cases are under the age of 15. While rare, accidental transmission in the laboratory setting has been reported.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

Report cases with *any* of the following laboratory criteria:

- Four-fold or greater rise in antibody titer to *R. rickettsii* antigen by immunofluorescence antibody (IFA), complement fixation (CF), latex agglutination (LA), microagglutination (MA), or indirect hemagglutination antibody (IHA) test in acute- and convalescent-phase specimens, ideally taken ≥ 3 weeks apart, or
- Positive polymerase chain reaction (PCR) assay for *R. rickettsii* genome, or
- Demonstration of positive immunofluorescence of skin lesion (biopsy) or organ tissue (autopsy), or
- Isolation of *R. rickettsii* from a clinical specimen.

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

Laboratory confirmation involves a single IFA serological titer of ≥ 64 or a single CF titer of ≥ 16 or other supportive serology (four-fold rise in titer or a single titer ≥ 320 for antibody to Proteus OX-19 or OX-2, or a single titer ≥ 128 by an LA IHA, or MA test). The Massachusetts State Laboratory Institute (SLI), Viral Serology Lab will perform serologic testing for *R. rickettsii*, the agent of RMSF, and for *R. typhi*, the agent of typhus (a zoonotic disease which is not spread by ticks but may have clinical similarities to RMSF) by IFA. Paired specimens (≥ 2 ml of serum) are preferable. For more information on specimen submission, call the Viral Serology Lab at (617) 983-6396.

Note: The SLI does not provide services for tick identification or testing of ticks for *R. rickettsii*.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify where RMSF occurs in Massachusetts, and to recognize areas in Massachusetts where RMSF incidence has changed (increased or decreased).
- To focus preventive education, and to target tick control measures.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report the occurrence of any case of Rocky Mountain spotted fever, as defined by the reporting criteria in Section 2) A above. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official CDC *Rocky Mountain Spotted Fever (Tick-Borne Typhus Fever) Case Report* form (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. Case Investigation

- a. It is the LBOH responsibility to complete CDC *Rocky Mountain Spotted Fever (Tick-Borne Typhus Fever) Case Report* form (in Appendix A) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.
- b. Use the following guidelines to assist you in completing the form:
 - 1) Accurately record the demographic information, occupation, whether hospitalized (including location and associated dates), date of symptom onset, symptoms, laboratory information, treatment information, healthcare provider information, and outcome of disease (e.g., recovered, died).

- 2) Exposure history: Use the incubation period range for Rocky Mountain spotted fever (3–14 days). Specifically, focus on the period beginning a minimum of 3 days prior to the case's onset date back to no more than 14 days before onset for the following exposures:
 - a) Determine if the case was bitten by a tick. If yes, ask and record information about the duration of tick attachment, date(s) and geographic location(s) where he/she was bitten.
 - b) Travel history: Determine the geographic area(s) visited by the case.
 - 3) Laboratory data: There is no need to fill out this section if you are submitting laboratory forms with the case report form or if laboratory forms have already been sent to MDPH.
 - 4) If the case was diagnosed at the same time with another tick borne disease (such as Lyme disease, ehrlichiosis, or babesiosis) please refer to other chapters in this manual and complete the appropriate case report forms.
 - 5) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.
- c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:
MDPH Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130
 - d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

None.

D. Preventive Measures

Environmental Measures

Advise individuals about the following information. Prevention of Rocky Mountain spotted fever involves making your yard less attractive to ticks.

- Remove leaf litter and brush from around your home.
- Mow lawns regularly, and prune low-lying bushes to let in more sunlight.
- Keep woodpiles in sunny areas off the ground.
- If you use insecticides around your home, always follow the label instructions and never use near streams or other bodies of water.

Personal Preventive Measures/Education

The best preventive measure is to avoid tick-infested areas. In areas where contact with ticks may occur, individuals should be advised of the following:

- Wear long-sleeved shirts and long, light-colored pants tucked into socks or boots.

- Stay on trails when walking or hiking.
- Use insect repellants properly. Repellants that contain DEET (diethyltoluamide) should be used in concentrations no higher than 15% for children and 30% for adults. Remember, repellants should *never* be used on infants. Permethrin is a repellant that can only be applied to clothing, *not* exposed skin.
- After each day spent in tick-infested areas, check yourself, your children, and your pets for ticks. Clothing should also be checked.
- Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out with steady pressure. Once removed, the tick should be drowned in rubbing alcohol or the toilet.

ADDITIONAL INFORMATION

The following is the formal Centers for Disease Control and Prevention (CDC) surveillance case definition for RMSF. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting a case to the MDPH always use the criteria outlined in Section 2) A.

Clinical description

A tickborne febrile illness most commonly characterized by acute onset and usually accompanied by myalgia, headaches, and petechial rash (on the palms and soles in two thirds of the cases).

Laboratory criteria for diagnosis

- Fourfold or greater rise in antibody titer to *Rickettsia rickettsii* antigen by immunofluorescence antibody (IFA), complement fixation (CF), latex agglutination (LA), microagglutination (MA), or indirect hemagglutination antibody (IHA) test in acute- and convalescent-phase specimens ideally taken ≥ 3 weeks apart, *or*
- Positive polymerase chain reaction assay to *R. rickettsii*, *or*
- Demonstration of positive immunofluorescence of skin lesion (biopsy) or organ tissue (autopsy), *or*
- Isolation of *R. rickettsii* from a clinical specimen.

Case classification

Probable: a clinically compatible case with a single IFA serologic titer of ≥ 64 or a single CF titer of ≥ 16 or other supportive serology (fourfold rise in titer or a single titer of ≥ 320 by Proteus OX-19 or OX-2, or a single titer of ≥ 128 by an LA, IHA, or MA test).

Confirmed: a clinically compatible case that is laboratory confirmed.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases*, 24th Edition. Illinois, American Academy of Pediatrics, 1997.

Beran, G.W. *Handbook of Zoonoses*, 2nd Edition, Section A: Bacterial, Rickettsial, Chlamydial, and Mycotic. Boca Raton, CRC Press, 1994.

Chin, J., ed. *Control of Communicable Diseases Manual*, 17th Edition. Washington, DC, American Public Health Association, 2000.

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MDPH. *Regulation 105 CMR 300.000: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998, (Printed July 1999).